UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/544,084	07/28/2005	Hiromoto II	KON-2020	9413

20311 7590 10/05/2009

LUCAS & MERCANTI, LLP
475 PARK AVENUE SOUTH
15TH FLOOR
NEW YORK, NY 10016

EXAMINER	
TUROCY, DAVID P	
ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
10/05/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

info@lmiplaw.com

Office Action Summary	Application No.	Applicant(s)	
	10/544,084	Il ET AL.	
	Examiner	Art Unit	
	DAVID TUROCY	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendments, filed 9/11/2009, have been fully considered and reviewed by the examiner. The examiner notes the amendment to independent claims. Claims 1-26 remain pending in the instant application.

Response to Arguments

2. Applicant's arguments filed 9/11/2009 have been fully considered and reviewed by the examiner. The examiner notes the filing of the translation of JP 2003197799 and the subsequent disqualification of US '136 under 103(c) for the teachings of superposing the frequencies. The examiner cites US Patent 6089181 as a showing of superposing frequencies, see rejection that follows.

The US '136 reference however has not been disqualified for its entire teachings because it still qualifies under 102(a) for those teachings that are not perfected by the translation of the JP 2003197799 reference.

Specifically, the examiner notes that the examiner can not locate support in the priority document for the teachings of the particulars of the claims as written. Specifically, the priority document does not effectively support all the limitations as presented in the claims as written and therefore supplying a translation of the prior document to perfect the priority date can not overcome the teachings of the reference that is not consistent with the teachings of the prior art document. Therefore the teachings of the references that are not disclosed or enabled in the priority document

can not be overcome by a perfection of a priority document. These undisclosed and not perfected limitations are rejected under 102(a). In other words the filing date of the present US application remains the effective filing date for the information that is inconsistent with the priority document. In other words, the foreign priority document. perfection (with statement of common ownership) can not be used to overcome the rejection of record because the reference, as applied, is considered a 102(a) reference for those teachings that are neither disclosed or suggested in the foreign priority document.

The applicant has argued against the Suemasa reference, stating that the reference fails to disclose a high and low frequency as claimed. The examiner disagrees and notes that Suemasa explicitly discloses a low frequency of 100 KHz to 10 MHz and a high frequency of 10 MHz to 100 MHz (column 4, line 62-column 5, line 10). Therefore, while Suemasa exemplifies 380 kHz, using a frequency below 200, including the taught 100 kHz would have led to predictable results.

As for the argument of vacuum, this is clearly an argument directed at the reference individually, when the reference is the entire teachings of the applied references.In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5, 12, 14, 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5290609 by Horiike et al., hereafter Horiike in view of US patent Publication 20030113479 by Fukuda et al., hereafter US '479 and further in view of US Patent Publication 20020043216 by Hwang et al., hereafter Hwang and US Patent 6089181 by Suemasa et al., hereafter Suemasa.

Horiike discloses a method of forming a metal oxide film on a substrate surface including the process of supplying a discharge, reducing, and reactive gas to deposit a first metal film by exposing the substrate to the excited reactive gas and thereafter providing an oxygen plasma to oxidize the metal film and thereby create and metal oxide film (Column 3, lines 1-15). Such plasma process would excite a discharge gas and oxygen gas and would transfer the energy to the gas in combination with the discharge gas, i.e. the reactive gas because such is inherent in a plasma process.

Horiike discloses vacuum processing and fails to disclose the frequency as claimed, however, US '479 discloses atmospheric pressure plasma has advantages over vacuum processing including elimination of expensive equipment and maintaining continuous processing (0004). US '479 discloses using a high frequency during the atmospheric plasma process to excite the gases (0245-0250). Therefore, it would have

been obvious to one of ordinary skill in the art to have modified Horiike to use the atmospheric plasma apparatus and process parameters to deposit the metal oxide thin film by the multistep process because one would desire to reap the benefit of reduced expenses related to equipment costs.

Horiike in view of US '479 fails to discloses moving the substrate between the first and second discharge space; however, Hwang teaches improving a single chamber ALD process by including a rotating shaft with various chambers, each chamber dedicated to a single process gas and rotating the substrates between the chamber (figures, 0046-0050). Hwang also discloses using plasma enhanced gases in the process to deposit a metal oxide thin film (0005, 0030-0031). Hwang discloses repetitively moving the substrate between the processing areas to form a metal oxide film (0046-0050). Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Horiike in view of US '479 to have rotated the substrates between the various processing zone with a reasonable expectation of successfully forming a ALD film and to reap the benefits as taught by Hwang.

Horiike in view of US '479 and Hwang fails to disclose superposing two frequencies to form the electric field, however, Suemasa discloses that such a technique for forming a film (note the disclosure exemplifies etching, but the plasma is discloses at column 1, lines 1-10 as being operable for deposition). Suemasa discloses the advantages to using superposing two frequencies over the traditional single frequency at column 1-2. Therefore, taking the references collectively, it would have

been obvious to one of ordinary skill in the art at the time of the invention to have modified Horiike in view of US '479 and Hwang to use superposing of the two frequencies with a reasonable expectation of successfully forming a plasma for deposition and to reap the benefits of such a technique as taught by Suemasa. As for the requirement of two "high" frequencies, this is clearly a relative term with no clear scope and it is the examiners position that the frequencies of Suemasa can reasonably be considered high frequencies.

Suemasa explicitly discloses a low frequency of 100 KHz to 10 MHz and a high frequency of 10 MHz to 100 MHz (column 4, line 62-column 5, line 10). Therefore, while Suemasa exemplifies 380 kHz, using a frequency below 200, including the taught 100 kHz would have led to predictable results. In the case where the claimed ranges "overlap or lie" inside ranges disclosed by prior art a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257 191 USPQ 90. See MPEP 2144.05.

Additionally, all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d.

Claims 2-3: The limitations of these claims are discussed above.

Claim 4-5: In addition to above, US '479 at 0110 and US '136 at 0040 discloses the discharge gas of nitrogen of 50% or more in combination with hydrogen, a reducing gas.

Claims 8-11: Horiike discloses multiple plasma steps and thus the process as taught by Horiike in view of US '479, Hwang and US '136 would necessarily include a third and fourth frequency, a third and fourth electrode, and applying the third frequency and fourth frequency to the third and fourth electrode as claimed.

Claim 12, 14: Horiike discloses forming a metal oxide film using an organometallic zinc (column 4).

Claim 15: Horiike discloses repeating first and second a plurality of times to form a film (Column 3, lines 1-15).

Claim 16: Horiike discloses a thickness of less then 10 nm (column 6, lines 35-37).

5. Claims 6-11, 13, and 17-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Horiike in view of US '479 and Hwang and further in view of US Patent Publication 2003/0232136 by Fukuda et al., hereinafter US '136.

Horiike in view of US '479 and Hwang and Suemasa discloses all that is discussed in the 35 USC 103(a) rejection above, however, the reference fails to discloses the plasma parameters as claimed, including the intensity relationship, and the power density. However, US '136 discloses a method of forming a plasma through a first and second electrode discloses providing the intensity relationship, power density, and frequency relationship as claimed (Column 9) results in forming a layer with high quality (Column 10, lines 1-4). Therefore, taking the references collectively it would have been obvious to one of ordinary skill in the art at the time of the invention to

have modified Horiike in view of US '479 to provide the plasma process parameters as taught by US '136 to reap the benefits of the increased film quality.

Claim 6: US '136 discloses the feature as claimed (0054).

Claim 7: US '136 discloses the claims relationship between the frequency, intensity and power density as claimed (0046).

Claim 13: US '136 discloses forming a transparent conductive film as claimed (0201).

Claim 17-25: The prior art discloses each and every limitation of these claims are discussed above.

Claim 26: Horiike in view of US '479, Hwang and US '136 discloses a substrate with a film thereon.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent Publication 20010028924 discloses supplying oxygen plasma to oxidize a metal film and performing multiple sequences to build a film of desired thickness (examples, 0036). US Patent 6200893 discloses supplying metal precursors and thereafter supplying hydrogen plasma to reduce to metal film and then an oxygen plasma to oxidize the metal film and repeating to form the desired film thickness (column 8-9).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID TUROCY whose telephone number is (571)272-2940. The examiner can normally be reached on Monday, Wednesday and Friday from 7 a.m. - 6 p.m., Tuesday and Thursdays 7-10 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David Turocy/

Examiner, Art Unit 1792